

Section 1

Directions: This section contains seven computational problems worth a total of 85 points. For each problem, you must present all your work, as well as the final answer, in order to receive full or partial credit.

1. Presented below is the frequency distribution of the number of sodas consumed in a given week obtained from a random sample.

Frequency	Stem &	Leaf
1.00	0 .	3
3.00	0 .	677
4.00	1 .	0334
3.00	1 .	569
1.00	2 .	0
0.00	2 .	
1.00	3 .	2
1.00	3 .	5
Stem width:		10
Each leaf:		1 case(s)

(a) Compute the mean. (5 pts.)

(b) Compute the median. (5 pts.)

(c) Comment on the skewness of the distribution. (5 pts.)

2. Let us suppose that all music CDs in the market have a mean retail price of \$13.00 and a standard deviation of \$1.50.

(a) Compute the z score for a CD priced \$16.60. (5 pts.)

(b) Using the Chebyshev's Rule, what can you infer about the percentage of the music CDs priced higher than \$16.60. (5 pts.)

3. In a small community in Missouri,
- (i) 60% of the residents are women,
 - (ii) 80% of the residents own a car, and
 - (iii) of all the residents who own a car, 55% are women.
- If you select one person at random from this community, what is the probability that the selected person will be:
- (a) a woman who owns a car? (Note: The events “being a woman” and “owning a car” are not independent.) (5 pts.)

 - (b) a woman or a car owner? (5 pts.)

 - (c) a car owner given that it is a woman? (5 pts.)
4. If you randomly draw two cards from a standard deck of cards without replacement, what is the probability that the second card will be a Queen? (Hint: Draw a tree diagram.) (5 pts.)
5. In France, a roulette wheel used in a casino has 37 slots, of which 18 are red, 18 are black, and 1 is green. A ball is rolled around the wheel and ends up in one of the slots with equal probability. Suppose that you bet \$20 on black. You will win \$20 if the ball ends up in a black slot (i.e., your \$20 bet is returned and an additional \$20 is rewarded), but you will lose \$20 if the ball ends up in a red or green slot (i.e., your \$20 bet is forfeited).
- (a) Find the expected winning (in dollars) of this game. (5 pts.)

 - (b) A roulette wheel used in a casino in the U.S. has one additional green slot. In which country, France or the U.S., would you have the better chance of winning the aforementioned roulette game (i.e., betting on black)? Show your reasoning. (5 pts.)

6. A recent poll by the Gallup Organization found that 20% of retail customers switched banks after their banks merged with another (*Bank Marketing*, February, 1999). A consumer support group selected a random sample of 20 customers whose banks merged with another and interviewed them whether the quality of service has changed since the merger.
- (a) What is the expected number of customers in the sample who have switched their banks? (5 pts.)
- (b) What is the probability that at least three but no more than one half of the customers in the sample have switched their banks? (5 pts.)
7. The number of automobiles arriving at a gas station on Hwy 70 during the daytime follows approximately a Poisson distribution with a rate of 20 passenger cars per 10 minutes and 12 trucks per 30 minutes.
- (a) Compute the mean number of passenger cars arriving at the gas station for a given 10-minute period. (5 pts.)
- (b) What is the probability that exactly 25 passenger cars will arrive at the gas station within the next 10 minutes? (5 pts.)
- (c) Compute the standard deviation of the number of trucks arriving at the gas station for a given 10-minute period. (5 pts.)
- (d) What is the probability that more than five trucks will arrive at the gas station within the next 10 minutes? (5 pts.)

Section 2

Directions: This section contains five multiple-choice questions worth a total of 15 points. For each item, read the question carefully and choose the best answer. No partial credit is offered.

1. (3 pts.) Which of the following is a random variable of the continuous type?
 - (a) Number of students in a class.
 - (b) Monthly wage (in dollars) of a person.
 - (c) Gas mileage (in mi/gal) of a passenger car.
 - (d) Both (b) and (c) above.
 - (e) No suitable choice.Answer: _____

2. (3 pts.) Events A and B being independent implies:
 - (a) $P(A \cap B) = 0$
 - (b) $P(A \cup B) = P(A) + P(B)$
 - (c) $P(B|A) = P(A)$
 - (d) $P(A|B) = P(A)$
 - (e) No suitable choice.Answer: _____

3. (3 pts.) If the distribution of income for a country is unimodal and the mean is greater than the median, what can be inferred about the skewness of the distribution?
 - (a) The distribution is symmetric.
 - (b) The distribution is positively skewed.
 - (c) The distribution is negatively skewed.
 - (d) The distribution is “mound shaped.”
 - (e) No suitable choice.Answer: _____

4. (3 pts.) According to the Empirical Rule, we would expect to see approximately ____% of the observations within 2 standard deviations (both sides).
 - (a) 13.5
 - (b) 34
 - (c) 47.5
 - (d) 68
 - (e) No suitable choice.Answer: _____

5. (3 pts.) Which of the following is true in regard to the standard deviation of a variable?
 - (a) It carries the original measurement unit.
 - (b) It will always be smaller than or equal to the variance of the same variable.
 - (c) It will never be zero.
 - (d) Both (a) and (b) above.
 - (e) No suitable choice.Answer: _____